*Ageing: Its Health Implications**

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1. Ageing: An Overview

The phenomenon of ageing conceived in terms of chronological measurement has become an area of demographic research and studies of ageing in human population are of quite recent origin. Rapid social and economic changes are expected to have serious implications for the circumstances under which the future elderly will live. These socio-economic changes consist of family nucleation, average smaller number of children per couple, greater longevity, physical separation of parents from adult children as a result of rapid urbanisation and age selective rural-urban migration and also the changing values of the younger generation against the older one.

Population ageing is an obvious consequence of the process of demographic transition. Being ahead in the process, the developed regions of the world have already been experiencing this situation and the developing world is well on its way to face a similar scenario. Though the proportion of elderly persons (defined in terms of aged 60 and above in a population) is low in some of the developing countries, the number of elderly persons in absolute numbers are more because of the large population base.

Projected increase in both the absolute and relative size of the elderly population in many third world countries is a subject of growing concern for social policy (Treas and Logue, 1986; Grigsby 1993; World Bank 1994). These increases are the result of changing fertility and mortality regimes over the last forty to fifty years. The combination of high fertility and falling mortality during much of the present century ensures that there will be large and rapid increases in elderly population as successively larger cohorts enter the older ages. Further, the recent sharp declines in fertility ensure an increasing share of future elderly. Given that these demographic changes have been accompanied by rapid and profound socio-economic change, cohorts have differed in their experience as they have aged. Despite growing awareness of recent and impending increases, few empirical assessments have been made of the accompanying compositional changes that might be expected in these elderly populations or to the historical and dynamic aspects of cohort succession which give rise to these changes.

With the background of transient fertility and mortality trends, it is worthwhile to preface our discussion with an account of the structure and magnitude of the elderly. The number of elderly in the developing countries has been growing at a phenomenal rate to the extent that in 1990 the population 60 years old and over in the developing countries exceeded that of the developed countries (estimated world total of 490 million). By 2030, that number will triple to 1.4 billion. Most of this growth will take place in developing countries and over half of it in Asia (World Bank 1994). Obviously, the two major population giants of Asia, namely India (Irudaya Rajan, Mishra and Sarma, 1999) and China contribute a significant proportion of this growing elderly in future. A detailed account of growing elderly population in India and its states (See Appendix Table A1) has been included.

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* A Major part of this paper has been extracted from the book India's Elderly: Burden or Challenge, Sage Publications, 1999.

Ageing and its Health Implications:

The changing age structure of the population results in different patterns of ageing. Consequently, the pattern of death and disability due to ageing in a population would also vary. This ageing pattern causes differential health risks in a population as a result of the epidemiological transition process. Secondly, extended years of life unaccompanied with better physical well being during later ages poses a greater demand for health services. Often, a high price is paid for ensuring disability free old age which is a resultant of postponing death with improvement in mortality. The following table shows the trend in expected years of life that an Indian will have beyond sixty years of age. Given that the expected years of life beyond sixty years is increasing, it will be essential to make these years free from disability. In fact, according to Murray and Lopez (1996) a quarter of this extended life will be with disability of one kind or the other. Also predictions are made with regard to these disabilities on account of non-communicable diseases mainly cardio-vascular, neuro-psychiatric, sense organ and respiratory related symptoms. Therefore, in order to make these additional years of life more productive and healthy, there is a need to plan and provide for an increasing burden of chronic disease morbidity, some of them rather debilitating for the elderly.

Table 1: Expectation of life at ages 60 and 70 for India.

Year	Male		Female	
	e60	e70	e60	e70
1971	13.80	8.57	14.75	9.10
1981	14.25	8.83	15.31	9.42
1991	15.01	9.27	16.23	9.97
2001	15.74	9.70	17.05	10.45
2011	16.29	10.03	17.75	10.87
2021	16.75	10.32	18.18	11.14

Demographic Transition and Epidemiological Transition:

The demographic transition described is accompanied by changes in the pattern of disease- the epidemiological transition first defined by Omran(1971). In the past, as nations underwent social and economic transformation, improvements were gradually reflected in changing pattern of disease for instance through control of infectious and parasitic diseases contributors to early mortality. However, the experience of recent decades has shown that developing countries are now undergoing changes in disease patterns, even in the absence of socio-economic development. This is largely due to impact of medical technology. A patient with tuberculosis for example would have died at a young age in the past is now likely to survive due to availability of effective treatment. The same could be said of a child living in a slum who will not experience infectious diseases such as measles or poliomyelitis due to availability of vaccines. The control of infectious diseases in the developing world has taken place more rapidly. For example the share of infectious and parasitic diseases causing death has been replaced by deaths due to cardiovascular diseases and neoplasm (Kalache, 1991). Though, some of these infectious diseases like pneumonia and dysentery remain widespread, they cause fewer deaths. On the contrary disease causing agents like cardiovascular, intestinal and respiratory infections are of greater importance in terms of morbidity or potentials years of life lost.

Trends in the duration of life lived with disability that accompany the epidemiological transition have been subject to extensive debate (Crimmins, 1990;

Murray and Chen, 1992). There are three types of theories or postulates put forward to explain the changes in disability that accompany mortality decline. Fries (1980, 1989) and colleagues (Fries et.al 1989, Leigh and Fries (1994) argue that with improvement in survival, the prevalence of disability will decline and therefore the proportion of life span lived in a disabled state will decrease. These theory is often called `*compression of morbidity hypothesis*'.

Conversely, an alternative set of theories have been proposed predicting that the proportion of the life span lived in disability will increase as mortality declines. Gruenberg (1977) suggest that as the survival of individuals with chronic conditions such as Down syndrome improves, the prevalence of these conditions would rise. Other authors (Alter and Riley, 1989; Feldman 1983 and Shepard and Zeckhauser, 1980) also forecast an increase in the disability. According to them medical interventions improve survival for more frail individuals who will subsequently experience higher incidence rates of disability. More recently Olshansky et.al (1991) further refined the expansion of morbidity hypothesis. A third theory (Manton, 1982) which shares element of both these view points, predicts that the progression of chronic diseases to severe disability will be slowed leading to a decline in the prevalence of severe disability but a rise in the prevalence of mild disability; the later would occur due to decline in mortality.

2. Health Concerns of Elderly

Health problems are supposed to be the major concern of the elderly as older people are more prone to suffer from ill health than the younger ones. It is often claimed that ageing is accompanied with multiple illnesses and physical ailments. Besides physical illnesses, aged are more likely to be victims of poor mental health which arises from senility, neurosis and extent of life satisfaction. Health therefore occupies prominence in any study of the elderly. In most of the primary surveys, the Indian elderly in general and their rural counterparts in particular are said to have some health problems.

Nandal, Khatri and Kadian (1987) found a majority of the elderly were suffering from ailments like cough, poor eyesight, anaemia and dental problems. The proportion that are ill among the elderly is found to be increasing with advancing age and the major physical disability is in terms of blindness and deafness. Shah (1993) in his study of urban elderly in Gujarat too finds deteriorating physical conditions among two thirds of elderly in terms of poor vision, hearing handicap, arthritis and loss of memory. An interesting observation made in this study was regarding the proneness of sick elderly towards availing treatment from private doctors.

Besides physical ailments, psychiatric morbidity is also prevalent among a significant proportion of the Indian elderly. An enquiry in this direction indicates that mental illnesses starts beyond the age of sixty years. While distinguishing between the functional disorders and organic disorders, it was noted that functional disorders are more common compared to organic disorders which occurs beyond 70 years of age. The National Sample Survey (1991) indicates that 45 per cent prevalence of chronic illness among the elderly and joint pain and cough were reported to be the most common health problems. The other diseases among the elderly found in the survey include blood pressure, heart disease, urinary problem and diabetes. A major cause for mortality among the elderly was respiratory disorders in rural areas and the disorders of circulatory system among the urban elderly. Another rural survey reported around 5 percent of the elderly as bed ridden and another 18.5 per cent as having limited mobility.

Given the background of the prevalence of ill health and disability among the elderly Vijay Kumar (1991) reports a feeling of dissatisfaction among the elderly

with regard to the provision of medical aid. This report also mentions that the sick elderly lack proper familial care and at the same time public health services are insufficient to meet the health needs of the elderly.

We have made an attempt to assess the health situation among Indian elderly with data from the National Sample Survey (1991) and the Ageing Survey (1993), carried out by us in four major states as a part of the study on elderly in India (more details, see Irudaya Rajan, Mishra and Sarma, 1999: Irudaya Rajan, 1993). The two major health concerns among the elderly are their disability/impairments and chronic disease prevalence. Also, their lifetime habits along with preference for type of treatment have also been analysed. These parameters are also examined with respect to three basic characteristics e.g. age, sex and marital status to understand the differential therein according to such characteristics.

The National Sample Survey (NSS) provides information specifically on the physical mobility as well as chronic disease prevalence. It is found that 44-47 aged males per thousand reported physical immobility as against 67-68 aged females per thousand at the all India level (Table 2). The male-female disparity in the proportion of persons with physical immobility observed at an all India level is also reflected both in rural and urban sectors. Physical immobility seems to be a function of age. Further, it is found that around 60 per cent of physically immobile among the elderly are in the old-old (70+) category.

Table 2: Proportion (per 000) Physically Immobile Aged persons by sex and residential Background, India.

Residence	Male	Female	Total
Rural	44	68	54
Urban	47	67	55

Source: National Sample Survey, 1991.

Table 3: Percentage Distribution of Physically Immobile Elderly by Age, Sex and Residential Background, India.

	Rural			Urban		
Age	Male	Female	Total	Male	Female	Total
60-64	22.71	19.93	21.30	19.10	18.07	18.59
65-69	20.88	19.88	20.37	24.66	19.83	22.34
70+	56.41	60.19	58.33	56.24	62.10	59.17

Source: National Sample Survey, 1991.

As can be seen from the Table 4, the proportion of aged persons with chronic disease varied between 443 to 455 per thousand persons at the all India level. This proportion among the aged males and females were of the same order in most of the states. With regard to the prevalence of chronic disease among the elderly, the problems of joints (46.96 per cent) followed by cough or Asthma related complaints (34.37 per cent) were found to be prominent. Though there remains no wide difference with regard to prevalence of chronic illness between rural and urban areas, the pattern of disease prevalence shows some differential (Table 5). For instance, heart disease, diabetes and blood pressure are more common among urban elderly compared to their rural counterparts. Such differential pattern of chronic disease between sexes does not seem significant except the female elderly sharing a little greater risk of being chronically ill.

Table 4: Proportion (per '000) of Aged Persons having Chronic disease by Sex and Residential Background, India.

Residence	Male	Female	Total
Rural	451	448	450
Urban	443	455	448

Source: National Sample Survey. 1991.

Table 5: Percentage Distribution of Type of Chronic Diseases among the Indian Elderly by Age and Residential Background.

Age	Cough	Piles	Problem of joints	Blood Pressure	Heart disease	Urinary problems	Diabetes
				Rural			
60-64	35.6	3.37	46.07	6.47	3.26	3.20	2.04
65-69	33.78	2.98	48.50	6.22	3.53	3.21	1.78
70+	33.69	3.35	46.65	6.52	4.33	4.05	1.41
60+	34.37	3.25	46.96	6.42	3.74	3.53	1.73
				Urban			
60-64	24.16	3.65	38.37	18.53	6.44	3.20	5.65
65-69	24.25	3.80	38.70	17.65	6.88	3.10	5.62
70+	24.95	3.38	39.16	16.60	5.93	5.23	4.76
60+	24.52	3.58	38.79	17.48	6.34	4.02	5.27

Source: National Sample Survey 1991.

3. Health Status : Some survey results from selected states

This section makes an attempt to assess the physical health and mental health of the elderly together with their preference in use of medical services (more details, see Irudaya Rajan, Mishra and Sarma, 1999). For this we have used the results of the Ageing Survey conducted by us as a part of the larger study on ageing sponsored by Economic and Social Commission for the Asia and Pacific, Social Development Section, Bangkok. This Survey covered four Indian states namely Tamil Nadu, Kerala, Gujarat and Karnataka.

This exercise has been carried out using the demographic terms of reference. Therefore, its precision from epidemiological/medical perspective may not be high. However, I present these findings as indicative of the well being experience of the elderly in parts of India. The self rating of the health status of elderly is presented against their individual characteristics (Table 6). Though such a biased assessment based on self rating may be subjective or relative, it has been considered as an assessment of health status of the elderly. This self assessment of health status was in three categories namely healthy, fairly alright and unhealthy and it was found that around two third of the elderly reported to be fairly alright as against ten percent who reported as unhealthy. The frequency of declaring themselves unhealthy increases with age and by the age of ninety, fifty percent of them reported themselves as unhealthy. Also, there appears no striking difference on the rating of health status by sex.

Table 6: Percentage Distribution of Elderly by Self Assessment of Health Status and individual characteristics.

Individual Characteristics		Healthy	Fairly Alright	Unhealthy
Age	60-64	28.6	65.5	5.9
	65-69	22.9	70.6	6.5
	70-74	21.8	64.7	13.5
	75-79	21.5	59.9	18.6
	80-84	11.7	66.2	22.1
	85-90	3.3	53.3	43.4
	90+	6.7	46.7	46.7
	Total	24.4	66.1	9.5
Sex	Male	24.7	66.6	8.7
	Female	24.0	65.4	10.6
Marital Status				
	NM	26.0	60.0	14.0
	CM	28.1	64.4	7.5
	W/D/S	18.0	69.5	12.4

Source: Ageing Survey

In order to identifying health problems faced by the elderly they were asked `were you sick at any time during the last one week/one month/one year?'. In addition they were also asked if they had a problem that they suffered from continuously. This information was analysed with respect to the age and sex of the respondent. In this regard, 35 per cent of the surveyed elderly reported having some or the other perennial health problem which seems to increase in proportion with increase in the age of the respondent (see Table 7). This phenomenon is not found significantly different between sexes except in the young-old category where females seem to be having an advantage over the males. Based on the information on sickness during last one week, one month and one year, the sickness prevalence with a week reference period is measured at 11.3 per cent and the same with reference of one month and one year is found to be 28.5 and 26.8 per cent respectively. With regard to the incidence of being bed ridden during last one year, around fifty percent of the male elderly and 60 percent of the female elderly have positive responses. This indicates the state of health among the elderly and the severe morbidity which sometimes affect them. Instances of being bed ridden are more frequently reported by old-old category.

Table 7: Age-Sex Distribution of the Elderly by perennial health problems and being bed ridden during last one year.

Perennial health Problems		Reported to be bed ridden during last one year	
Age	Male	Female	Male	Female
60-64	30.4	26.6	42.9	55.7
65-69	36.7	35.5	53.1	56.2
70-74	34.9	45.9	48.3	62.1
75-79	50.5	36.0	57.1	61.4

80-84	54.1	42.5	69.6	70.4
85-89	60.0	60.0	72.7	62.5
90+	33.3	55.6	50.0	83.3
All ages	35.2	34.6	49.3	58.7

Source: Ageing Survey

Disability/Impairments:

Certain disabilities like impairment in vision, hearing and movement are common consequences of deterioration of muscles and senses in old age. For evaluation of the prevalent extent of disability/handicap among elderly, the three aspects enquired were regarding the problems with vision, hearing and walking. The reported number of cases having problems on these counts are tabulated by age and sex. Following a listing of disability conditions the extent of use of aid to overcome such deficiencies and their effectiveness was also enquired into.

Table 8: Percentage Distribution of Elderly by different Handicaps.

Age	Type of Handicap		
	Vision	Hearing	Walking
60-64	28.9	7.8	11.9
65-69	32.8	8.9	15.7
70-74	35.6	12.0	19.9
75-79	45.3	19.8	29.7
80-84	54.5	31.2	44.2
85-90	66.7	33.3	43.3
90+	60.0	66.7	73.3
All Ages	33.7	11.1	17.4
Sex Male	35.4	11.3	17.6
Female	31.4	10.9	17.1

Source: Ageing Survey

Among the three major handicap faced by the elderly, handicap in vision seems to be prominent with one third of the elderly (see Table 8) having poor eyesight. Following this, mobility and hearing handicap account for 17.6 percent and 11.1 per cent of the surveyed elderly. These handicaps become more and more frequent with increasing age. A sex specific description of handicap prevalence puts females better compared to the male elderly. With regard to the extent of use of aid to overcome these handicaps, it is found that 27 per cent of those having vision handicap use spectacles and the same for those with hearing and walking handicap is 2.3 per cent and 8.6 per cent respectively. Further the effectiveness of the aids used is pretty high (i.e. 67.2 per cent) in case of vision handicap, whereas aids used are reported to be least effective in case of hearing impairment followed by walking. To assess the individual's physical ability, opinion was sought with regard to their travelling without depending on somebody. And in this context, males' physical ability seem to be more compared to the females, but this could also be reflective of gendered norms regarding appropriate female behaviour.

Lifetime Habits:

Individual health condition ought to have some bearing on ones personal habits and practices in relation to diet, exercise, occupation, sleep, smoking, drinking and chewing etc. Among the personal habits enquired use of tobacco in any form seems to be prominent. Some of these habits have a linkage with traditional

practice. Also there remains a subjective differential in these habits between sexes which perhaps can be attributed to the social acceptability.

As regard the frequency of eating, the surveyed elderly are reported to be eating on an average three times a day which is more or less same for both the sexes. Also the extent of appetite reported by the respondents reveals that 40 per cent of them do not have proper appetite. In addition, 36 per cent of the female elderly were found in the vegetarian category against the same being around 22 per cent for their male counterparts. Preference for vegetarian status seems to be increasing with increase in age as more than sixty per cent of the elderly in later ages are reported to be vegetarian. No doubt, the eating frequency per day shows a decline over age of the elderly. Similarly, the average number of sleeping hours reported comes between 7 to 8 hours a day. This too is not very different between males and females.

Use of health services:

The extent of use of health services is an indirect determinant of their access to health care. The frequent health problems among the aged calls for a regular utilisation of health services. Hence our interest lies in answering questions of the kind e.g. How do they cope with their health problems? Do they get adequate treatment?, Which system of treatment do they prefer? and who pays for their medical expenses? etc. In case of sickness, ninety per cent of the respondents irrespective of sex stated that they had consulted a doctor. And the most popular system of treatment preferred by the Indian elderly is the Allopathic system which is adopted by nearly ninety per cent of them. The rest ten per cent of the elderly adopt either Ayurvedic or Homeopathic system of medicine. Further the most common source of health service utilisation is reported to be from the Government followed by the private clinics and hospitals.

4.Summing up

Assessment of health status among the aged is commonly in terms of self rating, though it is considered subjective to evaluate an individual's health in terms of his/her self assessment. It is suggested in literature that self rating of health is an excellent choice for measuring health status especially in surveys.

The elderly population in India is growing and these increasing numbers need to be provided with adequate health care. There is a preponderance of chronic morbidity conditions among the elderly, with joint/arthritic problems and respiratory ailments among a majority of them. There is an urban-rural difference in this proportion of elderly having circulatory disorders like hypertension (BP) and heart disease. While most of them seek health care, it has been observed that for most common impairments associated with ageing like vision, hearing and mobility, only about two thirds used effective aids to overcome vision impairment. In the case of hearing and mobility, aids were used minimally by the elderly and their effectiveness were also limited. There is a need to make provisions not only for health needs but also for aids required to improve vision and hearing, that would improve the quality of life of the elderly.

Appendix

Table A1: Demographic Profile of the Aged, 1991-2021

States	Year	Population (000's)		Percentage to total population		Sex ratio	
		(60+)	(70+)	(60+)	(70+)	(60+)	(70+)
Andhra Pradesh	1991	4306	1425	6.47	2.14	102	106
	2021	11469	4475	11.63	4.54	104	110

Arunchal Pradesh	1991	37	12	4.23	1.42	83	90
	2021	134	49	7.02	2.57	86	85
Assam	1991	1186	448	5.29	2.00	81	76
	2021	3355	1153	9.34	3.21	90	89
Bihar	1991	5227	1803	6.05	2.09	86	85
	2021	13451	5123	8.11	3.09	100	99
Goa	1991	74	27	6.34	2.27	131	141
	2021	217	88	14.51	5.90	109	117
Gujarat	1991	2540	966	6.15	2.34	107	113
	2021	6791	2515	10.33	3.83	99	105
Haryana	1991	1230	528	7.47	3.21	93	81
	2021	2511	905	8.72	3.14	90	91
Himachal Pradesh	1991	402	164	7.79	3.18	89	87
	2021	744	286	9.58	3.69	114	120
Jammu & Kashmir	1991	432	163	5.78	2.18	77	75
	2021	1111	430	8.15	3.15	99	104
Karnataka	1991	3041	1149	6.76	2.56	101	105
	2021	7770	3020	11.18	4.34	101	102
Kerala	1991	2549	1006	8.77	3.46	115	121
	2021	5771	2324	15.63	6.30	117	130
Madhya Pradesh	1991	4254	1583	6.43	2.39	98	100
	2021	9704	3594	7.75	2.87	98	105
Maharashtra	1991	5453	1934	6.91	2.45	101	105
	2021	14019	5427	11.72	4.54	100	106
Manipur	1991	109	40	5.94	2.19	88	92
	2021	310	116	10.16	3.80	100	102
Meghalaya	1991	82	29	4.62	1.64	83	86
	2021	264	92	6.73	2.35	101	102
Mizoram	1991	34	12	4.93	1.77	96	105
	2021	108	38	8.61	3.01	95	99
Nagaland	1991	65	28	5.40	2.31	71	69
	2021	190	73	8.32	3.19	95	93
Orissa	1991	2217	794	6.98	2.51	99	98
	2021	5026	1935	10.60	4.08	99	104
Punjab	1991	1532	625	7.56	3.08	83	78
	2021	3558	1410	11.11	4.40	95	99
Rajasthan	1991	2666	917	6.06	2.08	98	103
	2021	6488	2422	7.59	2.83	99	105
Sikkim	1991	19	6	4.59	1.51	75	78
	2021	63	22	7.98	2.82	85	84
Tamil Nadu	1991	4073	1408	7.29	2.52	92	90
	2021	10261	4195	14.30	5.85	106	110
Tripura	1991	192	87	6.96	3.17	97	100
	2021	422	146	8.59	2.98	97	103
Uttar Pradesh	1991	9250	3403	6.65	2.45	81	77
	2021	19083	7256	7.10	2.70	97	97
West Bengal	1991	4087	1500	6.00	2.20	96	96
	2021	11495	4176	11.62	4.22	91	96
Andaman & Nicho-	1991	10	3	3.55	1.18	67	78
bar Islands	2021	53	19	12.13	4.32	79	68
Chandigarh	1991	29	11	4.52	1.73	83	87
	2021	136	48	15.71	5.53	81	79
Dadra Nagar	1991	6	2	4.40	1.24	122	140
Haveli	2021	23	8	8.35	2.95	103	115
Daman & Diu	1991	6	2	6.32	2.43	150	168
	2021	17	6	11.41	4.30	107	123
Delhi	1991	444	154	4.71	1.63	85	86
	2021	1764	606	11.29	3.88	81	82
Lakshadweep	1991	3	1	5.22	1.68	92	93

	2021	8	3	10.19	4.00	110	116
Pondicherry	1991	56	21	6.90	2.55	108	105
	2021	144	56	12.60	4.88	104	112
All India	1991	55606	20252	6.58	2.40	94	93
	2021	136459	52018	9.87	3.75	99	103

Source: Irudaya Rajan, Mishra and Sarma, 1999

References

Treas, J. and Logue, B. (1986) Economic Development and the Older Population. Population and Development Review. Vol. 12(4), pp.645-673.

Grigsby, J. (1993) Paths for Future Population Aging, The Gerontologist, Volume 31, No. 2, April, pp.195-203.

World Bank (1994) Averting the Old Age Crisis: Policies to Protect the Old and Promote Growth. Oxford University Press, Oxford.

Irudaya Rajan, S. 1992a. Growing Old Gracefully. Chapter II in Nair, K.R. (ed). 1992. Geriatric Neurology. Published by Trivandrum Association of Neurology, Trivandrum.

Irudaya Rajan, S. 1992b. Aging in India. Paper presented at the Workshop on Development of Comprehensive National Policies on Aging: Life-long Preparatory Measures including Social Security, organized by the Social Development Section, United Nations, Bangkok, held at the Social Development Section, United Nations, Bangkok, 29-31, October.

Irudaya Rajan, S and U S Mishra. 1997. Population Aging: Causes and Consequences. Chapter 12, Pp. 222-236 in K C Zachariah and S Irudaya Rajan (eds) 1997. Kerala's Demographic Transition: Determinants and Consequences. Sage Publications, New Delhi.

Kumar, S. Vijaya. 1991. Family Life and Socio-Economic problems of the Aged. Delhi:Ashish Publishing House.

Nandal, D.S., R.S. Khatri and R.S. Kadian. 1987. Aging problems in the structural context. In M.L. Sharma and T.M. Dak (Eds. Aging in India. Ajanta publications (India) New Delhi, pp. 106-16.

National Sample Survey Organisation. 1991. Socio-Economic Profile of the Aged persons : NSS 42nd Round (July 1986 - June 1987) Sarvekshana, Vol.15 No.2. New Delhi.

Irudaya Rajan, S, U S Mishra and P S Sarma. 1995c. Living Arrangements among the Indian Elderly. Hongkong Journal of Gerontology, Volume 9, No 2, Pp. 20-28.

Shah, V.P. 1993. The Elderly in Gujarat. Department of Sociology, Gujarat University, Ahmedabad (Mimeographed).

Murray, C.J.L and A.D. Lopez (1996) `Alternative Visions of the Future: Projecting Mortality and Disability, 1990-2020.' in Murray and Lopez (Eds), The Global Burden of Disease. Harvard School of Public Health.

Crimmins, E.M. (1990) `Are Americans healthier as well as Longer Lived?'Journal of Internal medicine, vol.22, pp.89-92.

Murray, C.J.L and L.C. Chen (1992) `Understanding Morbidity Change' Population and Development Review, Vol.18(3), pp.481-503.

Fries, J.F. (1980) `Aging, Natural Death and the Compression of Morbidity' New England Journal of Medicine, Vol.303(3),pp130-135.

Fries, J.F. (1989) `The Compression of Morbidity:Near or Far?' Milbank Quarterly. Vol.67(2), pp.208-232.

Fries, J.F. et.al (1989)` Health Promotion and the Compression of Morbidity' Lancet. pp.481-

Leigh, J.P. and J.F. Fries (1994) `Education, Gender and Compression of Morbidity' International Journal of Aging and Human Development, Vol.39(3), pp.233-246.

Gruenberg, E.M. (1977) `The Failure of Success' Milbank Quarterly/Health and Society, vol.55, pp.3-24.

Alter, G. and J.C. Riley (1989) `Frailty, Sickness and Death: Models of Morbidity and Mortality in Historical Populations' Population Studies, vol.43, pp.25-45.

Feldman, J. (1983) `Work Ability of the Aged under Conditions of Improving Mortality' Milbank Memorial Fund Quarterly/Health and Society, vol.61, pp.430-444.

Shephard, D. and Zeckhauser, R. (1980) `Long Term Efforts of Interventions to Improve Survival of Mixed Populations' Journal of Chronic Diseases, vol.33, pp.413-433.

Olshansky, S.J. et.al. (1991) `Trading off Longer Life for Worsening Health: The Expansion of Morbidity Hypothesis' Journal of Aging and Health, vol.3, pp.194-216.

Manton, K.G. (1982) `Changing Concepts of Morbidity and Mortality in the Elderly Population', Milbank Quarterly/Health and Society, vol.60, pp.183-244.

Omran, A.R. (1971) `The Epidemiological Transition: A Theory of Epidemiology of Population Change' Milbank Memorial Fund Quarterly, Vol.49.

Kalache, A. (1991) `Aging in Developing Countries' in M.S.J. Pathy (ed) Principles and Practice of Geriatric Medicine, Second Edition, C.J.Willey.